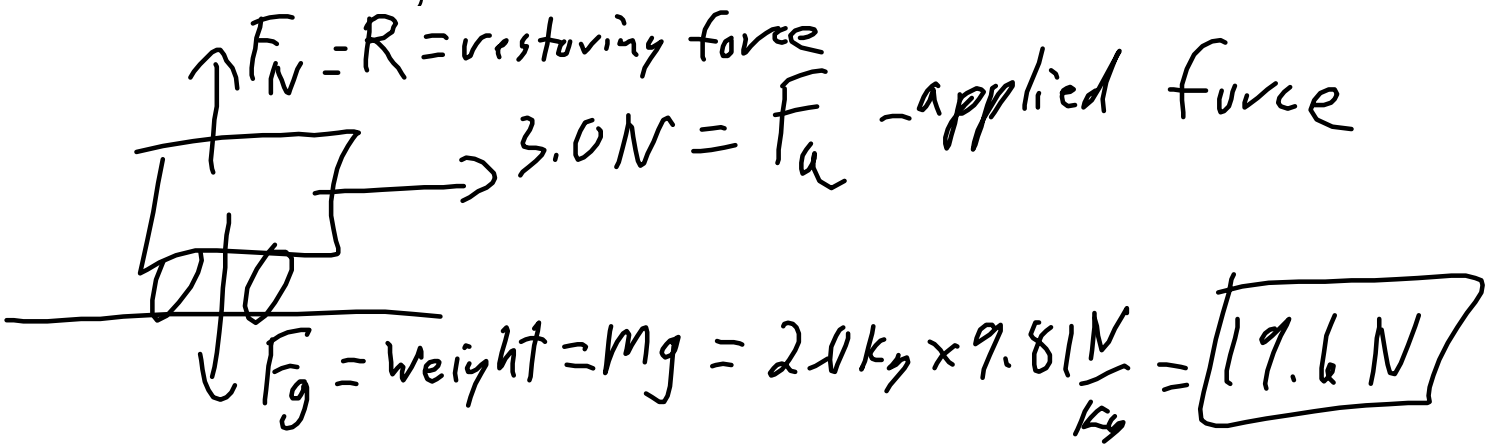
go over questions from the board
look at pulley problems (200 and 250g masses over a pulley)
prep for lab next class - friction

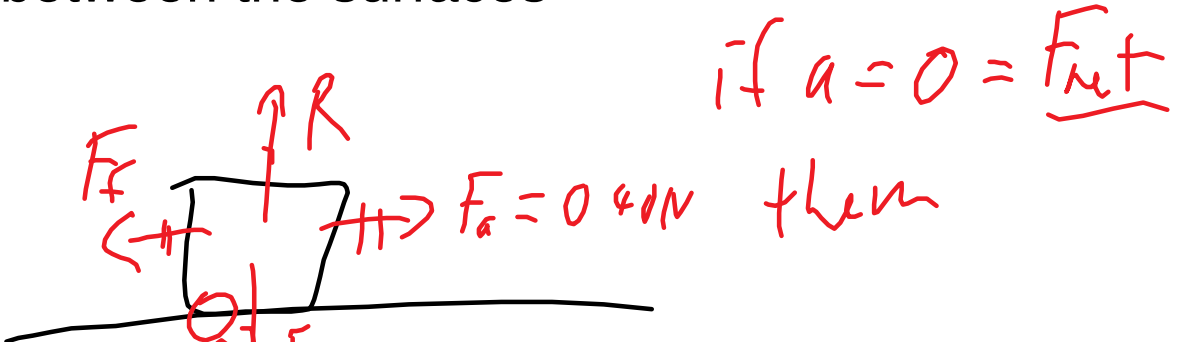
eg. You pull a 2.0 kg cart with a force scale.

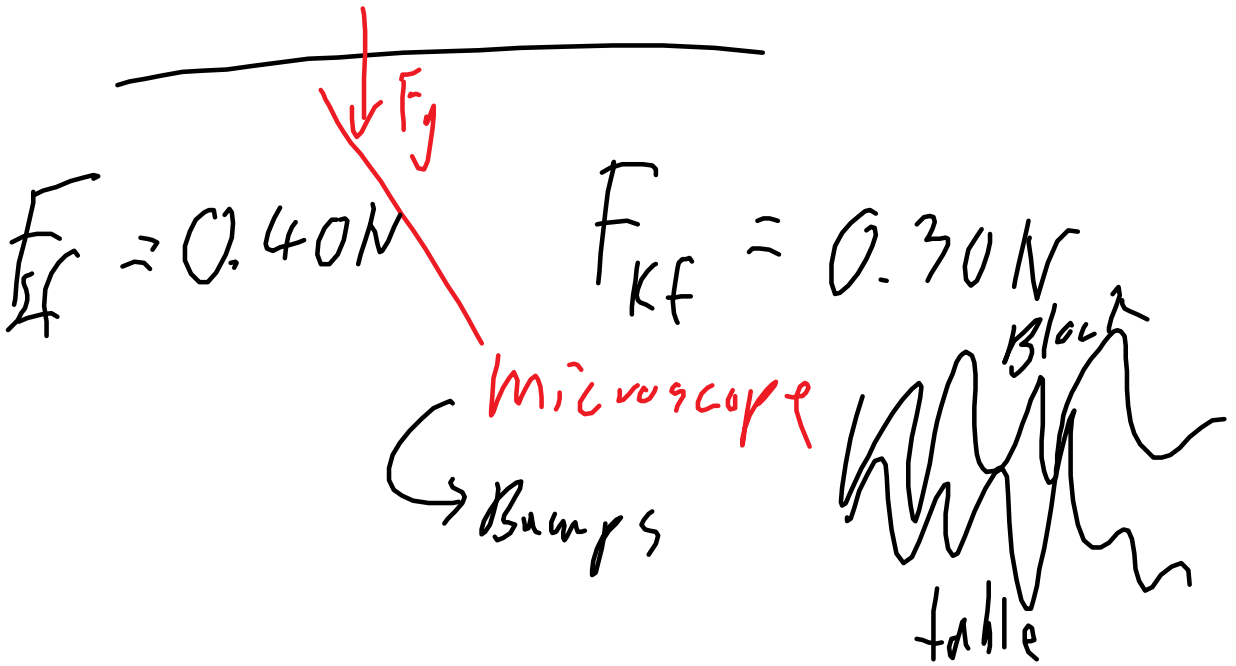
a) if friction is negligible and the reading on the scale is 3.0 N, what is the acceleration?



$a=F_{net}/m = F_a/m$ as other forces all cancel
$a=3.0N/2.0kg = 1.5m/s^2$ $N=kgm/s^2$

b) if you pull the cart and 0.40N is required to get is going and 0.30 N keep it going at a constant speed, what is the static and kinetic frictional forces?
static friction - friction when there is no relative motion between the surfaces





static friction tends to be larger than kinetic friction because the bumps sink into the recesses more when static, but skip along when in motion.

The coefficient of friciton μ, is the force of friction over the normal force - the force the ground pushes up - perpendicular to the surface. What is the weight(force of gravity) of the cart? $F_g = mg$ what is the coefficient of static and kinetic friciton?

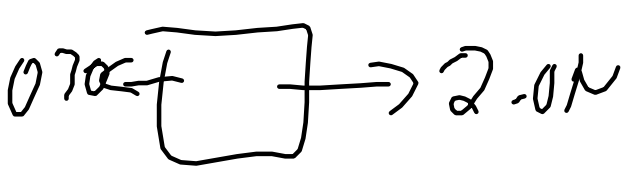
$\mu = F_f/R$ definition of the coefficient of friction

- influenced by the surfaces - lab next class - check factors that influence the coefficient
- $\mu_s = F_f/R = 0.40N/19.6N = 0.4/19.6 = 0.0204$
- $\mu_s = 0.020$ no units

$\mu_k = 0.3/19.6 = 0.0153 = 0.015$

c) Assuming the kinetic friction is constant, if you

pulled the cart with 2.0 N, what would be the acceleration?



$F_{net} = F_a - F_f$

$= 2.0N - 0.30N$

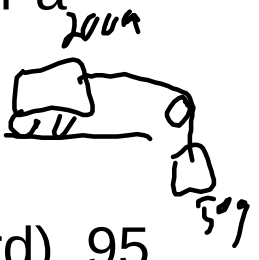
$= 1.7N$

$a = F_{net}/m =$ $1.7N / 2.0kg = 0.85 m/s^2$

a) You stand on a scale in an elevator from the test. What does the scale read in every section. (say the scale reads in Newtons)

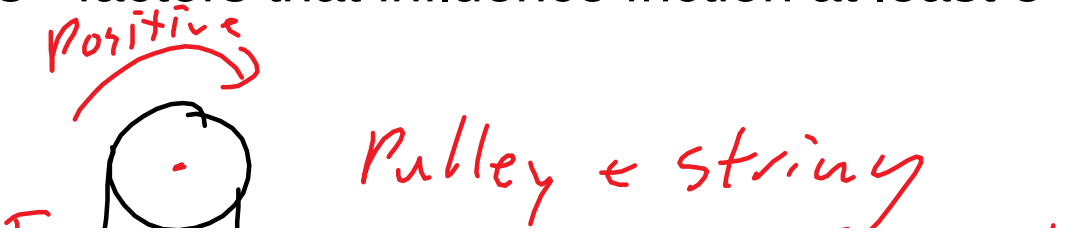
2. Determine the net force, acceleration and tension in the string between a 200 g mass and a 250g mass suspended over a pulley.

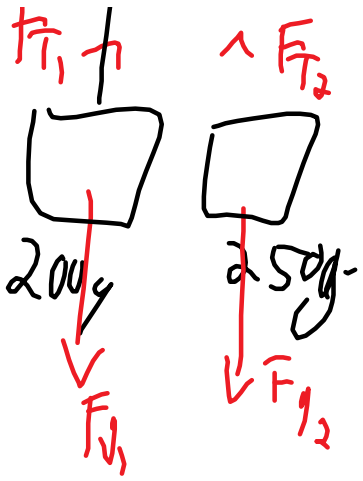
1. Determine the net force, acceleration and tension in the string between a 200 g mass on the table and a 50g mass suspended over a pulley if a) frictionless b) the 200g mass experiences a 0.10 coefficient of friction



Hecht p131 q 41, 47, 68, 69, 71, 81, 92(hard), 95

Prep for lab next class -
hypothesis - factors that influence friction at least 5 to test





massless + frictionless

then $F_{T_1} = -F_{T_2}$

$a \rightarrow$ whole system

$-F_T$ cancels out

$F_T \rightarrow$ Part of the system

$$F_{net} = F_{g_2} - F_{g_1} + F_{T_1} - F_{T_1} = ma$$

m = mass of whole system

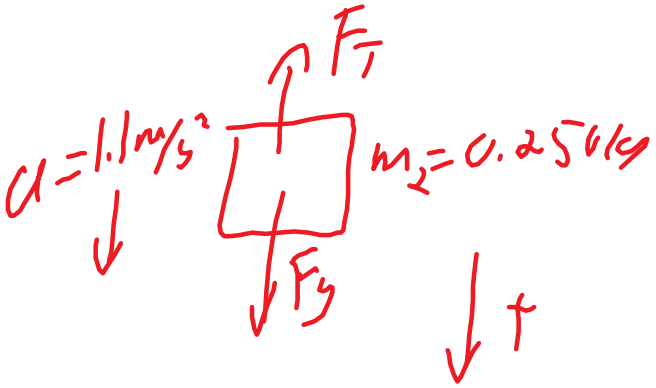
$$m_2 g - m_1 g = (m_1 + m_2) a$$

$$a = \frac{(m_2 - m_1) g}{(m_1 + m_2)}$$

$F_{net} = 0.49 N$

$$a = \frac{(0.250 kg - 0.20 kg)\ 9.81 N/kg}{(0.250 + 0.200 kg)}$$

$$a = 1.1\ m/s^2$$



$+\downarrow$

$$F_{net} = m_2 a$$

$$F_g - F_T = m_2 a$$

$$F_T = F_g - m_2 a$$

$$F_T = m_2 (g - a)$$

$$F_T = 0.25\ kg\,(9.8 - 1.1)$$

$$F_T = 2.2\ N$$

$$d = \frac{1}{2} a t^2$$

$$a = \frac{2d}{t^2} = \frac{2(1.0\ m)}{(1.5\ s)^2}$$

$$a = 0.89\ m/s^2$$

rr


off